

REPORT NUMBER: 703
MSDS NO: PZ0119
EFFECTIVE DATE: 10/12/94

VAN WATERS & ROGERS INC.
MATERIAL SAFETY DATA SHEET

PAGE: 001
VERSION: 003

PRODUCT: CHLORINE

ORDER NO: 178680
PROD NO : 240890

DOW CHEMICAL CO
GLYCOL TWO PLANT

PLAQUEMINE ,LA 70764

VAN WATERS & ROGERS INC. , SUBSIDIARY OF UNIVAR (206)889-3400
6100 CAPILLON POINT , KIRKLAND , WA 98033

----- EMERGENCY ASSISTANCE -----

FOR EMERGENCY ASSISTANCE INVOLVING CHEMICALS CALL - CHEMTREC
(800)424-9300

----- FOR PRODUCT AND SALES INFORMATION -----

CONTACT YOUR LOCAL VAN WATERS & ROGERS BRANCH OFFICE AT
VWR GEISMAR 504-473-1100 GEISMAR , LA

PRODUCT NAME:
CHLORINE

MSDS #: PZ0119

- - CHLORINE

DATE: 04/26/94
EDITION: 014
TRADE NAME: CHLORINE
CHEM NAME/SYN: CHLORINE

CHEMICAL FAMILY: HALOGEN
FORMULA: CL2
CAS NUMBER: 007782-50-5
U.S. DOT SHIPPING NAME: CHLORINE
U.S. DOT HAZARD CLASS: 2.3 (POISON GAS - INHALATION HAZARD - HAZARD ZONE B)
SUBSIDIARY RISK: N/A
I.D. NUMBER: UN1017
PACKING GROUP: N/A
REPORTABLE QUANTITY: 10 LBS/4.54 KG
CHLORINE IS A MARINE POLLUTANT.
TDG CANADA: CLASS 2.3 (5.1) PER SU4175

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SECTION 1 - PHYSICAL DATA

BOILING POINT @ 760 MM HG: -29.31 F (-34 C)
VAPOR DENSITY (AIR=1): 2.67 @ 70 F
SPECIFIC GRAVITY (H2O=1): 1.465 LIQUID @ 0/4 C
PH OF SOLUTIONS: ACIDIC
FREEZING/MELTING POINT: -101 C
SOLUBILITY (WEIGHT % IN WATER): 0.73 @ 20 C

BULK DENSITY: 3.2 GRAMS/LITER
VOLUME % VOLATILE: 100
VAPOR PRESSURE: 4996 MM HG @ 68 F
EVAPORATION RATE: N/A
HEAT OF SOLUTION: UNKNOWN

APPEARANCE AND ODOR:

GREENISH-YELLOW GAS UNDER ATMOSPHERE CONDITIONS OR AMBER LIQUID UNDER
PRESSURE. PUNGENT AND IRRITATING ODOR.

SECTION 2 - INGREDIENTS

MATERIAL	PERCENT
CHLORINE	99.9
INERT INGREDIENTS	BALANCE

SECTION 3 - FIRE/EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED):
NON-FLAMMABLE

FLAMMABLE LIMITS IN AIR (% BY VOLUME)
LEL: N/A
UEL: N/A

EXTINGUISHING MEDIA:
N/A

SPECIAL FIRE FIGHTING PROCEDURES:

FIREFIGHTERS MUST WEAR NIOSH/MSHA-APPROVED, SELF-CONTAINED BREATHING APPARATUS WITH FULL FACE-PIECE. CHLORINE CONTAINERS SHOULD BE IMMEDIATELY REMOVED FROM THE VICINITY OF A FIRE. IF THEY CANNOT BE REMOVED, NOTIFY FIREFIGHTERS AND SPRAY WATER TO COOL CONTAINERS. DO NOT SPRAY WATER ON LEAKING

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CONTAINERS.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

WILL SUPPORT COMBUSTION. REACTS READILY WITH HYDROCARBONS, ALCOHOLS, ETHERS
AND SOME METALS, POSSIBLY WITH EXPLOSIVE VIOLENCE. WILL REACT WITH (BURN)
STEEL CONTAINERS AT TEMPERATURES ABOVE 450 F.

SECTION 4 - HEALTH HAZARD DATA

TOXICITY DATA:

LC50 INHALATION: (RATS) 293 PPM, 1-HOUR
LD50 DERMAL: SEE SECTION 5
SKIN/EYE IRRITATION: SEE SECTION 5
LD50 INGESTION: SEE SECTION 5
FISH, LC50 (LETHAL CONCENTRATION): (BLUEGILL) 0.4 MG/L, 96-HOUR

CLASSIFICATION:

INHALATION: SEE SECTION 5
SKIN: SEE SECTION 5
SKIN/EYE: SEE SECTION 5
INGESTION: SEE SECTION 5
AQUATIC: SEE SECTION 5

SECTION 5 - EFFECTS OF OVEREXPOSURE

IS CHEMICAL LISTED AS A CARCINOGEN OR POTENTIAL CARCINOGEN?

NTP - NO IARC - NO OSHA - NO

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:

NONE KNOWN.

PERMISSIBLE EXPOSURE LIMITS:

OSHA: 0.5 PPM, 8-HOUR TWA, (TIME-WEIGHTED AVERAGE); 1 PPM, 15-MINUTE STEL
(SHORT-TERM EXPOSURE LIMIT); 29 CFR 1910.1000, REV 3/1/89.

ACUTE:

INGESTION: NOT APPLICABLE FOR GAS. LIQUID COULD PRODUCE SEVERE BURNS
AND INJURY ON CONTACT.

EYE/SKIN: LIQUID AND CONCENTRATED GAS COULD PRODUCE SEVERE BURNS AND
INJURY ON CONTACT.

CHLORINE GAS CAN CAUSE A STINGING OR BURNING SENSATION TO THE EYES AT

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CONCENTRATIONS AS LOW AS 3-6 PPM.

SKIN EXPOSURE TO GAS MAY CAUSE A BURNING SENSATION, INFLAMMATION, OR EVEN BLISTER FORMATION. WORKERS IN ELECTROLYTIC CHLORINE PLANTS MAY DEVELOP A FORM OF ACNE, PARTICULARLY EVIDENT AROUND THE EARS.

INHALATION: LETHAL CONCENTRATION FOR RABBITS, CATS, AND GUINEA PIGS BASED ON 30-60 MINUTE EXPOSURE = 0.4-0.9 MG/L AIR (280-630 PPM). INHALATION CAN CAUSE COUGHING, SNEEZING, SHORTNESS OF BREATH, SENSATION OF TIGHTNESS IN THE CHEST, AS WELL AS SEVERE RESTLESSNESS OR ANXIETY, NAUSEA, AND VOMITING. THE NOSE AND THROAT MAY BECOME IRRITATED; A STINGING AND BURNING SENSATION MAY BE EXPERIENCED. IMMEDIATE FATALITIES CAN OCCUR AS A RESULT OF SUFFOCATION. DELAYED FATALITIES CAN OCCUR AS A RESULT OF PULMONARY EDEMA (FLUID IN THE LUNGS). FOR THIS REASON, REST AND IMMEDIATE ATTENTION AFTER INHALATION IS IMPORTANT. PERSONS WITH KNOWN CARDIOVASCULAR OR LUNG PROBLEMS SHOULD NOT RISK CHLORINE EXPOSURE.

STUDIES HAVE BEEN CONDUCTED EXPOSING HUMAN VOLUNTEERS TO AIRBORNE CONCENTRATIONS OF CHLORINE BETWEEN 0.5 AND 2 PPM FOR UP TO 8 HOURS. IN THESE STUDIES, EIGHT-HOUR EXPOSURES TO 1 PPM PRODUCED TRANSIENT CHANGES IN PULMONARY FUNCTION AND INCREASED SUBJECTIVE IRRITATION. EIGHT-HOUR EXPOSURES AT 0.5 PPM PRODUCED NO SIGNIFICANT CHANGE IN PULMONARY FUNCTION AND LESS SEVERE SUBJECTIVE IRRITATION.

CHRONIC: REPEATED EXPOSURES CAN RESULT IN A LOSS OF ABILITY TO DETECT THE ODOR OF CHLORINE. LONG-TERM EXPOSURES MAY CAUSE DAMAGE TO TEETH AND INFLAMMATION OR ULCERATION OF THE NASAL PASSAGES.

A STUDY WAS CONDUCTED ON DIAPHRAGM CELL WORKERS AT 25 PLANTS MANUFACTURING CHLORINE IN NORTH AMERICA WHERE EXPOSURES RANGED FROM 0.006 PPM TO 1.42 PPM WITH A MEAN OF 0.146 PPM. THE STUDY FOUND THAT THESE CHLORINE WORKERS WERE NOT AFFECTED IN ANY MEASURABLE WAY BY YEARS OF EXPOSURE TO LOW LEVELS OF CHLORINE. THERE WAS NO HIGHER INCIDENCE OF ABNORMAL CHEST X-RAYS, ABNORMAL EKG'S OF PULMONARY FUNCTION AMONG THESE WORKERS.

ENVIRONMENTAL HAZARD: THIS PRODUCT IS VERY TOXIC TO FISH--KEEP OUT OF LAKES, STREAMS, OR PONDS.

FISH, LC50 (LETHAL CONCENTRATION):

FRESHWATER FISH

A. COLD WATER FISH (TROUT) - LC50 = 6-60 MICROGRAM/L OR 0.006-0.060 MG/L OF TOTAL RESIDUE CHLORINE AT DIFFERENT LIFE STAGES AND FOR DIFFERENT SPECIES.

B. WARM WATER FISH - LC50 = 0.09 - 0.3 MG/L OF TOTAL RESIDUE CHLORINE

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EMERGENCY AND FIRST AID PROCEDURES

INHALATION:

IMMEDIATELY REMOVE PATIENT UPWIND FROM CONTAMINATED AREA. IF PATIENT IS BREATHING, PLACE IN A COMFORTABLE POSITION; KEEP WARM AND AT REST UNTIL A PHYSICIAN ARRIVES. IF BREATHING IS DIFFICULT, GIVE OXYGEN. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IN ALL

ABOVE CIRCUMSTANCES, CALL A PHYSICIAN AS SOON AS POSSIBLE. REST IS RECOMMENDED AFTER CHLORINE EXPOSURE.

EYE OR SKIN CONTACT:

IMMEDIATELY FLUSH EYES WITH WATER (SOAP AND WATER FOR SKIN) FOR AT LEAST 15 MINUTES, WHILE REMOVING CONTAMINATED CLOTHING. IF IRRITATION OCCURS, CONSULT A PHYSICIAN. NEVER ATTEMPT CHEMICAL NEUTRALIZATION! DO NOT GIVE ANY MEDICATION EXCEPT UNDER SPECIFIC INSTRUCTIONS FROM A PHYSICIAN.

INGESTION.

THROAT IRRITATION: DRINKING MILK MAY HELP RELIEVE THE DISCOMFORT OF THROAT IRRITATION FROM CHLORINE EXPOSURE.

COUGHING: HOT COFFEE OR TEA IS OFTEN USED TO ALLEVIATE COUGHING INDUCED BY CHLORINE EXPOSURE.

NOTES TO PHYSICIAN (INCLUDING ANTIDOTES).

TREAT PATIENTS OF CHLORINE OVEREXPOSURE SYMPTOMATICALLY. ALSO, OBSERVE AND TREAT FOR POSSIBLE ONSET OF PULMONARY EDEMA, WHICH MAY BE DELAYED.

SECTION 6 - REACTIVITY DATA

STABILITY:

STABLE

CONDITIONS TO AVOID:

EXCESSIVE HEAT & CONTAMINATION OR CONTACT WITH MATERIALS BELOW

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: NONE

INCOMPATIBILITY (MATERIALS TO AVOID):

ORGANIC MATERIALS SUCH AS HYDROCARBONS, ALCOHOLS, AND ETHER; AMMONIA, HYDROGEN, AMINES

HAZARDOUS DECOMPOSITION PRODUCTS:

NONE

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SECTION 7 - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS SPILLED OR RELEASED:

IMMEDIATELY EVACUATE ALL PERSONNEL BY FIRST MOVING AT RIGHT ANGLES TO THE WIND DIRECTION UNTIL CLEAR OF THE EXPOSURE AREA. ONLY TRAINED PERSONNEL WEARING NIOSH/MSHA APPROVED, SELF-CONTAINED BREATHING APPARATUS OR FULL FACEPIECE AIRLINE RESPIRATORS WITH AUXILIARY SCBA'S OPERATED IN THE PRESSURE/DEMAND MODE SHOULD BE PERMITTED TO ENTER AREA. NEVER PUT WATER ON A CHLORINE LEAK. TO LOCATE LEAK USE COMMERCIAL AMMONIA WATER (26 BE') IN A SQUEEZE BOTTLE OR A CLOTH TIED TO A STICK AND DIPPED IN AMMONIA WATER. WHEN AMMONIA WATER IS HELD NEAR (BUT NOT ON) A CHLORINE LEAK OR IS SPRAYED INTO THE AIR NEAR A CHLORINE LEAK, A WHITE FOG OF AMMONIA CHLORIDE FORMS. CARE SHOULD BE TAKEN TO AVOID SPRAYING AMMONIA WATER ON COPPER FITTINGS. PERSONNEL WEARING FULL FACEPIECE, SELF-CONTAINED BREATHING APPARATUS SHOULD POSITION THEMSELVES UPWIND SO ESCAPING CHLORINE MOVES AWAY FROM THEM. FOR LEAKS IN CYLINDERS AND TON CONTAINERS, ROTATE CYLINDER SO GAS ESCAPES INSTEAD OF LIQUID. IF POSSIBLE, REMOVE TO AN ISOLATED SPOT. EMERGENCY CAPPING KITS FOR CYLINDERS, TON CONTAINERS, TANK CARS, AND TANK TRUCKS INCLUDE STEP-BY-STEP INSTRUCTIONS AND TOOLS. A TECHNICAL SERVICE BULLETIN CONTAINING COMPLETE INFORMATION ON THESE KITS IS AVAILABLE.

WASTE DISPOSAL METHOD:

CHLORINE CAN BE ABSORBED IN ALKALINE SOLUTIONS. COMMON SOLUTIONS ARE CAUSTIC SODA AND SODA ASH.

ALKALINE SOLUTIONS FOR CHLORINE ABSORPTION				
CHLORINE CONTAINER SIZE	CAUSTIC SODA LB(100%)	WATER(GAL.)	SODA ASH LB	WATER(GAL.)
100 POUNDS	125	40	300	100
150 POUNDS	188	60	450	150
1 TON	2500	800	6000	2000

PLACE NEUTRALIZED MATERIAL IN A CLOSED CONTAINER. FOR GUIDANCE IN DISPOSAL OF NEUTRALIZED MATERIAL, CONTACT YOUR REGIONAL OFFICE OF THE ENVIRONMENTAL PROTECTION AGENCY (EPA). DO NOT DISCARD TO SEWER.

NOTE: CARE MUST BE TAKEN WHEN USING OR DISPOSING OF CHEMICAL MATERIALS AND/OR THEIR CONTAINERS TO PREVENT ENVIRONMENTAL CONTAMINATION. IT IS YOUR DUTY TO DISPOSE OF CHEMICAL MATERIALS AND/OR THEIR CONTAINERS IN ACCORDANCE WITH THE CLEAN AIR ACT, THE CLEAN WATER ACT, THE RESOURCE CONSERVATION AND RECOVERY ACT, AS WELL AS ANY OTHER RELEVANT FEDERAL, STATE OR LOCAL LAWS/REGULATIONS REGARDING DISPOSAL.

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SECTION 8 - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

USE NIOSH/MSHA APPROVED ACID GAS CARTRIDGE OR CANISTER RESPIRATOR FOR ROUTINE WORK PURPOSES WHEN CONCENTRATIONS ARE ABOVE THE PERMISSIBLE EXPOSURE LIMITS. USE FULL FACEPIECE RESPIRATORS WHEN CONCENTRATIONS ARE IRRITATING TO THE EYES. A CARTRIDGE-TYPE ESCAPE RESPIRATOR SHOULD BE CARRIED AT ALL TIMES WHEN HANDLING CHLORINE FOR ESCAPE ONLY IN CASE OF A SPILL OR LEAK. RE-ENTER AREA ONLY WITH NIOSH/MSHA APPROVED, SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE. SEE SECTION 7 FOR RESPIRATORY PROTECTION DURING SPILLS OR LEAKS.

THE RESPIRATOR USE LIMITATIONS SPECIFIED BY NIOSH/MSHA OR THE MANUFACTURER MUST BE OBSERVED. RESPIRATORY PROTECTION PROGRAMS MUST BE IN ACCORDANCE WITH 29 CFR 1910.134.

VENTILATION(TYPE):

USE GENERAL OR LOCAL EXHAUST VENTILATION SUFFICIENT TO MAINTAIN EMPLOYEE EXPOSURE TO CHLORINE BELOW PERMISSIBLE EXPOSURE LIMIT.

EYE PROTECTION:

CHEMICAL SPLASH-PROOF SAFETY GOGGLES

GLOVES:

LEATHER OR RUBBER

OTHER PROTECTIVE EQUIPMENT:

BOOTS, APRONS, AND CHEMICAL SUITS SHOULD BE WORN WHEN NECESSARY TO PREVENT SKIN CONTACT. PERSONAL PROTECTIVE CLOTHING AND USE OF EQUIPMENT MUST BE IN ACCORDANCE WITH 29 CFR 1910.132 AND 29 CFR 1910.133.

SECTION 9 - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN DURING HANDLING AND STORING:

- STORE IN WELL-MAINTAINED, FIREPROOF AREA AWAY FROM OTHER CONTAINERS.
- KEEP AWAY FROM HEAT AND MOISTURE! HEATING COULD MELT PLUGS ON CYLINDERS AND TON TANKS AND CAUSE SAFETY VALVES ON TANK CARS TO VENT, CAUSING LEAKS. MOISTURE (MORE THAN 150 PPM OR WATER) AND CHLORINE CAN FORM HYPOCHLORIC AND HYPOCHLOROUS ACIDS, WHICH ARE CORROSIVE.
- NEVER, PLACE A LEAKING CONTAINER IN WATER OR SPRAY LEAKING CONTAINER WITH WATER.
- MAKE SURE PIPING IS DRY AND FREE OF CONTAMINATION OF ANY TYPE BEFORE ADMITTING CHLORINE.
- USE ONLY DRY, OIL-FREE AIR (-40 F DEW POINT MINIMUM) OR OIL-FREE NITROGEN

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- FOR PURGING, TESTING FOR LEAKS, OR PADDING.
- NEVER TAMPER WITH FUSIBLE PLUGS OR SAFETY DEVICES ON CONTAINERS; NEVER
MANIFOLD CONTAINERS FROM LIQUID VALVES.

OTHER PRECAUTIONS:

- PERSONNEL NEAR OR HANDLING CHLORINE SHOULD AT ALL TIMES, CARRY A MIOSH/
MSHA APPROVED CHEMICAL CARTRIDGE TYPE ESCAPE RESPIRATOR AND BE TRAINED IN
ITS USE.
- AVOID BREATHING GAS!
- USE WITH ADEQUATE VENTILATION! VENTILATION MUST BE SUFFICIENT TO LIMIT
EMPLOYEE EXPOSURE AT OR BELOW PERMISSIBLE LIMITS.
- AVOID CONTACT WITH EYES, SKIN, AND CLOTHING! AT HIGH CONCENTRATIONS,
CHLORINE IS CORROSIVE TO EYES, SKIN, AND MUCOUS MEMBRANES.

COMMENTS:

TSCA - CHLORINE IS ON THE TSCA INVENTORY UNDER CAS NO. 7782-50-5.

SAFA TITLE III - A) 311/312 CATEGORIES - ACUTE, REACTIVITY AND SUDDEN
PRESSURE RELEASE, B) LISTED IN SECTION 313 UNDER CHLORINE, C) LISTED AS
AN "EXTREMELY HAZARDOUS SUBSTANCE" IN SECTION 302.

CERCLA - LISTED IN TABLE 302.4 OF 40 CFR PART 302 AS A HAZARDOUS SUB-
STANCE WITH A REPORTABLE QUANTITY OF 10 POUNDS. RELEASES TO AIR, LAND
OR WATER WHICH EXCEED THE PQ MUST BE REPORTED TO THE NATIONAL RESPONSE
CENTER, 800-424-8802.

NSF - THE CHLORINE IS CERTIFIED FOR MAXIMUM USE AT 30 MG/L UNDER ANSI/
NSF STANDARD 60.

CANADIAN WHMIS: SENSITIZATION TO PRODUCT - NONE KNOWN, B) REPRODUCTIVE
TOXICITY - NONE KNOWN, C) ODOR THRESHOLD: 1 PPM, D) PRODUCT USE: WATER
SANITIZATION, CHEMICAL REACTANT.

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----- FOR ADDITIONAL INFORMATION -----

CONTACT: MSDS COOPDINATOR VW&R GEISMAR
 DURING BUSINESS HOURS, PACIFIC TIME (206)889-3400

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